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DIAGRAMING SURFACE CHARACTERISTICS OF TRUE FIR LOGS

SUPPLEMENT TO LOG DIAGRAMING GUIDE FOR WESTERN SOFTWOODS

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ABSTRACT

Since the log diagraming guide for western softwoods was first published in 1963, certain changes and supplemental information to the guide have been found that would facilitate future studies of log and tree characteristics. The changes concern diagraming surface and end characteristics of logs and trees. Instructions for diagraming true fir log characteristics are described in detail.

Keywords: Log diagram rules, forest measurement, logs, log defect indicators.

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Instructions for diagraming surface and end characteristics of western softwoods are described in the guide developed by Jackson et al.[1] The purpose of the guide is to establish standard minimum procedures for diagraming western softwood logs for timber and veneer recovery studies. This insures that data from individual studies will be collected properly and uniformly and can be combined for broad timber quality and product recovery studies covering the commercial range of individual species. In a recent preliminary study of grade defects in true firs,[2] it became apparent that certain changes and supplemental information to the guide would facilitate future studies of log and tree characteristics. The diagraming changes that apply specifically to true firs are reported in this note.

NEW FEATURES

Several log characteristics or features not discussed in the guide appear to be important as quality indicators. The following are instructions for diagraming these characteristics in true firs.

BLACKHEART

Water-infused wood, also known as wetwood or blackheart, occurs mainly in the lower bole of trees. Generally circular in pattern (fig. 1), it varies from brown to black.

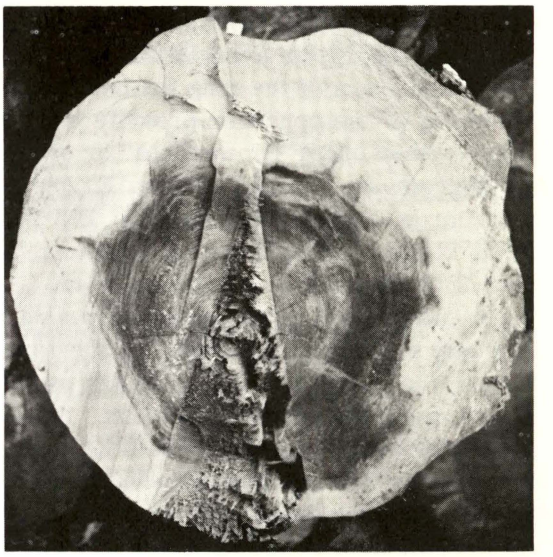

Figure 1.—Blackheart or wetwood in central core of a white fir butt log.

Sketch the blackheart to scale on the log-end circles, measure and record its average diameter to the nearest inch, and indicate its color. For example, BH-14 black represents a 14-inch black blackheart area. If sketching is not feasible because of other log-end characteristics (such as rot), note the presence of blackheart under "Comments" by giving its average diameter (to the nearest inch) and its color at the large end (LE) and small end (SE) of the log. Example: BH-LE 14 black, BH-SE 8 brown, means a black 14-inch and a brown 8-inch diameter blackheart area occurring, respectively, on the large and small ends of a log. If blackheart is found at only one end of a log, record its presence as before; however, for the end

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[1] *George H. Jackson, John W. Henley, and Willard L. Jackson. Log diagraming guide for western softwoods. Pac. Northwest Forest & Range Exp. Sta. USDA Forest Serv. 32 p., illus. 1963.*

[2] *W. Y. Pong. Preliminary study of grade defects in the true firs. Interim report. 1967. (Unpublished report on file at Pac. Northwest Forest & Range Exp. Sta.)*

without blackheart, write "None" after the appropriate log-end symbol (LE or SE) under "Comments" or after the symbol "BH" in the log-end circle.

In some logs, a ring of water-infused wood surrounds a relatively drier circular portion and is within an apparently drier peripheral section (fig. 2). Record the average outer and inner diameters of the ring for both ends of the log (if the condition prevails at both ends) either under "Comments" or at the appropriate log-end circles. Example (if recorded under "Comments"): BH-LE 14-10 black, BH-SE 8 brown, means a ring of black colored blackheart at the large end of the log, the outer and inner diameters are, respectively, 14 and 10 inches; the small end of the log has an 8-inch diameter brown blackheart. The same blackheart condition would have the notation BH-14-10 black and BH-8 brown if recorded on the appropriate log-end circles.

Figure 2.—A ring of wetwood in a grand fir log.

EXUDATION

Exudation is a discharge, old or fresh, of abnormal watery or pitchy flow on the log surface.[3] The flow may originate from several of the surface characteristics found on a log.

Describe the type and color of flow with appropriate symbols. These symbols (set off with parentheses) should be entered after the symbol for the surface characteristic involved and, except for log knots, before the dimensions. Use BK for black, BR for brown, and Y for yellow for color-coding the flow.

WI-color: Old (inactive) watery flow which has a since stopped. The bark and exposed wood over which the exudate flowed and the surface characteristic from which the flow originated are now dry and stained.

WA-color: Fresh (active) watery flow. The bark and exposed wood over which the exudate is flowing and the surface characteristic from which the flow originates is wet and stained.

PI-color: Old (inactive) pitchy flow which has since stopped. The bark and exposed wood over which the exudate flowed and the surface characteristic from which the flow originated are now covered partly or wholly with dry crystalline resin.

PA-color: Fresh (active) pitchy flow. The bark and exposed wood over which the exudate is flowing and the surface characteristic from which the flow originates is covered partly or wholly with fresh or tacky resin.

[3] *In true firs, resin production is generally restricted to the bark or phloem tissue of these species; resin canals are generally absent in the wood or xylem.*

Do not include in the diagram watery or pitchy flow resulting from limbing of live branches or from other fresh wounds resulting from the logging operation. Include only the flow from surface characteristics existing before logging. Thus for a pitch-covered live knot, the notation for the pitch should be excluded; but for an opened frost crack or seam, the abnormal flow of fresh pitch is included in the diagram. For example: SC-O (Frost)-(PA-Y) 16' x 3 x 2 symbolizes a 16-foot-long by 3-inch-wide by 2-inch-deep open frost crack or seam from which abnormal yellow pitch is actively flowing.

It is not uncommon to find both pitch and watery flow coming from the same surface characteristic. In this case, use appropriate symbols for both on the diagram--each with its color notation--and set them off with parentheses, listed in descending order of importance. For example: SC-O(Frost)-(WA-BK)-(PA-Y) 16' x 3 x 2 symbolizes an open frost crack or seam from which both black watery exudate and yellow pitch are actively flowing; the flow of pitch appears of secondary importance.

ADDITIONS TO FEATURES

The following log characteristics are discussed to some extent in Jackson et al. but are described in more detail here for diagraming true firs.

BURL

A burl is a hard, woody bark-covered protuberance on the log surface, round or elliptical in shape, and without protruding main limbs or remnants of former main limbs. Aborted or dormant adventitious buds or small epicormic branches may be present. Bark pattern of burls is usually abnormal, i.e., fissures are often slanted or at right angles to the normal position. Burls are attached to the log usually in one of two ways (fig. 3): (A) abruptly with a pinched-in base, i.e., the largest diameter at the point of attachment is less than the largest diameter of the burl; or (G) gradually with a tapered base, i.e., the largest diameter at the point of attachment is equal to or greater than the largest diameter of the burl.

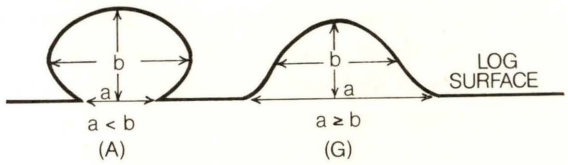

Figure 3.—Attachment of burls to log surface: **A,** *Abrupt with a pinched-in base; or* **G,** *gradual with a tapered base.*

In diagraming, indicate how the burl is attached to the log surface. Show with proper symbols why a burl is considered unsound if found in that condition (see description for unsound burl below). Indicate any abnormal flow of pitch or water. Measure length and width at the point of attachment to the log and height above the regular bark surface, all to the nearest inch. Sketch size and shape of the burl at its point of attachment and describe with appropriate symbols, as follows:

BL-A or G: A sound burl without signs of decay, insects, or dead wood. Attachment is abrupt (A) or gradual (G).

UBL-A or G: An unsound burl, having the same general shape and attachment as a sound burl but for the various reasons listed below considered unsound:

PD = partially or completely dead
R = rot
WH = worm holes (for details on size classification see Jackson et al., p. 15).

These symbols (set off with parentheses) follow the symbol for the type of attachment (A or G). More than one reason can be listed for the unsound condition of a burl. List the reasons in descending order of importance, each set off with parentheses. Note also any abnormal flow of pitch or water. For example: UBL-A(R)(WH-P)(WA-BK) 10 x 8 x 6 symbolizes an unsound abruptly attached burl whose unsoundness is due (in descending importance) to rot and pin-size worm holes, with active black watery flow and which measures 10 by 8 by 6 inches.

When burls are associated with aborted or dormant adventitious bud formation, identify further by adding the letter "E" to the appropriate symbol for sound and unsound burl:

EBL-A or G: A sound epicormic burl attached abruptly or gradually.
EUBL-A or G: An unsound epicormic burl attached abruptly or gradually (give above reason(s) for unsound condition).

If epicormic branching is found on a burl, indicate with dots those one-half inch or less in diameter; diagram all others and indicate size (for details see Jackson et al., p. 8-9).

CANKER

A canker is a partially open lesion and is characterized by destruction or distortion of tissue, callus formation, and pitchy or watery flow in varying amounts. Most common causes are infections of dwarf mistletoe and various rusts.

Sketch location and shape of the outer edges. For unsound cankers, indicate the reason for unsound condition. Indicate the type and color of abnormal flow of exudate present and record maximum length, width, and depth to the nearest inch. Record type or cause of canker if possible. Use appropriate symbols to describe condition of canker:

Cank: A sound canker without signs of decay, insects, or deadwood. Superficially the canker may appear rotten but below it is sound. It may be necessary to probe with a hatchet to find the true condition of the canker. Note an abnormal flow of pitch or water. Example: Cank (PI-BR) 26 x 5 x 3 symbolizes a sound canker with inactive brown pitch flow, measuring 26 by 5 by 3 inches.
U Cank: An unsound canker of the same general shape as a sound canker, but considered unsound for various reasons. If more than one reason is evident, list in descending order of importance the reasons. Note also abnormal pitchy or watery flow. For example: U Cank (R) (WH-P)-(WA-BK) 26 x 5 x 3 symbolizes an unsound canker whose condition is primarily due to rot and secondarily to pin-size worm holes, with active black watery flow, measuring 26 by 5 by 3 inches.

CHECKS

Two types of checks should be considered. (a) Natural check is radial separation of wood fibers from the heart (pith) outward; it is caused by stresses within the log or external forces acting on the tree (e.g., wind). (b) Weather check is radial separation of wood fibers from the perimeter inward toward the pith; it is caused by stresses resulting from the drying of exposed wood. (For details on diagraming see Jackson et al., p. 11-12.) Checks in the true firs seldom contain resin or pitch.

There are two types of natural checks:

Heart check (HC): A single straight-line separation of wood fibers resulting from either a single radial check extending in one direction from the pith or two radial checks extending more or less in opposite directions from the pith. Look carefully for any short checks branching from the main one. If check is straight (i.e., distance from any point on the check to a straight line connecting the ends of the check is one-half inch or less) and no "branch-outs" show which would result in a "blocked-out" width greater than one-half inch, record only the length dimension to the nearest inch adjacent to the sketch of the heart check. If check is crooked (i.e., one or more points on the check deviate more than one-half inch from a straight line connecting the ends of the check), or if "branch-outs" exist (resulting in a "blocked-out" width of more than one-half inch), sketch the actual shape on the log-end circle and record the length and width dimensions of the "blocked-out" area to the nearest inch.

Multiple check(MC): Three or more radial checks extending angularly from the pith; extreme cases of multiple checking have a spiderweb-like pattern. Sketch the actual shape of the multiple check and any "branch-outs" on the log-end circle and record the length and width dimensions of the "blocked-out" area to the nearest inch.

CLUSTER

Two or more limbs (one must be greater than one-half inch) growing in a more or less inseparable group form a cluster (KCL).

If the cluster contains only two log knots diagram and show sizes of those which are greater than one-half inch. If knot is one-half inch or smaller, record it as a dot but do not show its size. If the cluster contains more than two log knots, sketch the outline of the cluster to scale, symbolize with "KCL," and diagram and show sizes of all log knots within the cluster that exceed one-half inch (see Jackson et al., p. 9, for log knot symbols). Indicate the general location of the smaller log knots (one-half inch or less) using dots, but do not include size. Measure length and width of the cluster to the nearest inch. If possible, show which log knot in the cluster is the main or "heart" knot (i.e., originating from the pith as opposed to originating from an adventitious bud) by labeling it "H"--relative size and the presence of heartwood are possible criteria for identifying the main knot. If any one cluster has more than one main knot, label each knot as "H."

EPICORMIC BRANCH

Small sprout-type limbs that originate from dormant or adventitious buds are known as epicormic branches (E). They are variable in size, seldom attain 2 inches in diameter, and may occur singly or in clusters.

If occurrence is single and size is one-half inch or less (regardless if dead or alive), record as a dot with an "E" but do not record size. For larger branches and overgrowths, use appropriate symbols as previously outlined for other log knots (see Jackson et al., p. 8-9, for details), record size, and designate with "E." For example, ⊙ 1E means a 1-inch live epicormic log knot; X3/4E means a 3/4-inch epicormic overgrowth. If epicormic branches occur in a cluster and *all* are one-half inch or less in diameter, sketch the outline of the cluster to scale and show "EKCL"

alongside; indicate the general location of the branches in the cluster using dots but do not include size. Measure length and width of cluster to nearest inch and height (if applicable) to nearest half of an inch. If the cluster contains a limb over one-half inch, diagram it as a knot cluster.

In the true fir species where epicormic branching is quite prevalent, these instructions for diagraming are limited to the butt and second logs of the tree. Ignore epicormic branches in upper logs except where they are 1 inch or greater in diameter or where there is some doubt as to their origin, i.e., whether epicormic or originating from the pith. Include any questionable log knot on the diagram regardless of location.

Take care to differentiate between an epicormic branch scar (overgrowth) and a scar left by a large resin blister. In many cases they look very much alike--especially in noble fir, grand fir, and, to some extent, silver fir.

POINTS TO NOTE

Diagraming instructions for several of the log characteristics as given in the Guide require minor additions or changes when they are applied to the true firs. These additions and changes are listed below.

BUMP

At times differentiating a bump (a small bark-covered swelling on a log surface) from a small burl may be difficult. If the height of the protuberance in question is less than half its diameter at the point of attachment, classify it as a bump; otherwise, classify it as a burl and diagram it as such.

EXUDATION

The procedure for diagraming abnormal pitchy and watery flow has already been discussed. There are several surface characteristics which can exhibit this abnormal flow. These include bird peck, burl, canker, conk, dead knot, rotten knot, overgrowth, sucker limb, and scar and seam. Whenever this flow occurs, include the description of the surface characteristic from which the exudate is flowing or has flowed in the past.

LIVE LOG KNOT

In true fir species, the absence of bark on limbs does not necessarily indicate encased log knots. After the limb on a true fir dies, it keeps its bark only a short time. The problem of whether a bare limb represents a dead or live knot is further confounded by the fact that in the true firs a tree keeps its branches a long time. In judging whether or not a log knot is dead, give little weight to the absence of bark. Instead, give more weight to indicators of a dead log knot such as the amount of callus tissue around the base of the limb, the weathered condition of the limb, e.g., bleaching or eroding, fracturing of the limb, and the condition of and proximity to other nearby dead or live limbs.

SPIRAL GRAIN

Spiral grain occurs more in true firs than is generally thought. Aside from the evidence listed in Jackson et al. (p. 5-6) for detecting spiral grain, two other characteristics are found extensively in the firs: (a) spiral frost cracks and scars and (b) the rotation of a natural check when viewed at both ends of the log. It is important to draw accurately both of these log characteristics on the diagram.

SUCKER LIMB

Indicate the condition of sucker limbs on the diagram, i.e., dead, live, or rotten. Scars and seams similar in appearance to those classified as frost cracks are invariably found with sucker limbs. Record these on the diagram using the symbols suggested in Jackson et al., (p. 10) for scars and seams and noting the causal agent as the sucker limb. Example: SC-P (Sucker) 2' x 2 x 1 means a partially open sucker limb scar measuring 2 feet long, 2 inches wide, and penetrating 1 inch into the log.

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